

REMARKS

Claims 1-33 are pending. Claims 5-11, 14-27 and 30-33 have been withdrawn from consideration.

Applicants Response to Claim Rejections under 35 U.S.C. §102:

Claims 1-4, 12, 13, 28 and 29 stand rejected under 35 U.S.C. 102(b) as being anticipated by **Tan et al.** (U. S. Patent No. 6,001,706) (hereinafter "**Tan**"). Applicants respectfully traverse.

The Office Action states: "Tan discloses a semiconductor device fabrication method comprising the step of: polishing the surface of a film-to-be-polished 18 formed over a semiconductor substrate 10 by polishing slurry/CMP process (fig. 10A and col. 5, lines 53-62); and after the surface of the film-to-be-polished 18 has been planarized, further polishing the surface of the film-to-be-polished 18 by polishing slurry/CMP process one more time (fig. 10B)."

However, **Tan** does not teach dual polishing steps. Rather, **Tan** only discloses alternative polishing processes. Specifically, **Tan** states: "Referring now to FIG 10A, the gap fill layer 18 is chemical mechanical polished (CMP) back to the silicon nitride layer 14 using an appropriate polishing tool and slurry. Alternatively, as shown in FIG. 10B the gap fill oxide layer 18 can be polished back to the polysilicon layer 13" (col. 5, lines 53-57) (emphasis added).

In **Tan**, the process shown in FIG. 10B is performed instead of the process shown in FIG 10A. Hence, according to **Tan**, there is no further polishing performed after the surface of the gap fill layer (film-to-be-polished) 18 has been planarized.

On the other hand, the present invention pursuant to independent claims 1 and 2, discloses dual polishing. In the present invention, a surface of a film-to-be-polished is polished by using a

polishing slurry containing abrasive grains and an additive of a surfactant (main-polish) (see FIG. 21 C of the present application), and a finish-polish is performed while the polishing slurry and water (or mixture of the polishing slurry and water) are being supplied onto a polishing pad after the surface of the film-to-be-polished has been planarized. **Tan** neither discloses nor suggests this feature of the present invention.

The present invention solves a particular problem which occurs in a case that the surface of the film-to-be-polished is polished by using the polishing slurry containing abrasive grains and the additive of a surfactant. In the present invention, since a finish-polish is performed while the polishing slurry and water (or mixture of the polishing slurry and water) are being supplied onto a polishing pad, the depth of dishing; and hence, variations of film thickness distributions of the buried oxide films are decreased.

In a case that the surface of the film-to-be-polished is polished by using the polishing slurry containing abrasive grains and the additive of a surfactant (main-polish), the polishing rate becomes extremely low when the surface of the film-to-be-polished has been planarized, and the film-to-be-polished remains on the stopper film. The film-to-be-polished on the stopper film must be removed by finish-polish. If the finish-polish is performed while only water is being supplied onto the polishing pad, the depth of dishing formed in the surfaces of the buried oxide films varies considerably, and variation of film thickness distributions of the buried oxide films is increased. The present invention addresses this problem, which is not taught or suggested by **Tan**.

Further, the present invention is distinct from the conventional CMP process which utilizes CMP slurry composition and surfactants, such as TMAH or TBAH in a water solution. The Office Action additionally states: "conventional CMP process is a method of simultaneous pad and substrate rotations with pressure applied between the polishing pad and substrate in the presence of the CMP slurry composition (comprising ZrO_2 particles, for example) and a surfactant, such as TMAH or TBAH in a water solution. {see Wang (U.S. 6,046,112)(col.6, lines 13 —17)}".

The main-polish of the present invention is performed without supplying water to stop the polishing by itself before the polishing has reached the stopper film. The finish-polish of the present invention is performed with the polishing slurry and water (or mixture of the polishing slurry and water) supplied onto the polishing pad for suppression of the variation of the depth of dishing and suppression of the variation of the film thickness distributions of the buried oxide films. These feature of the present invention are neither disclosed nor suggested in the cited prior art references.

In view of the aforementioned accompanying remarks, Applicants submit that that the claims are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

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Attorney Docket No. 042341

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If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Michael J. Caridi", is written over the printed name.

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